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Japanese Patent application Unexamined Publication No.2000-51800

[Scope of Claim]

[Claim 1] A washing apparatus, characterized by comprising:

a compressed air supply means for supplying compressed air;
a water supply means for supplying water;
a detergent supply means for supplying a detergent; and
a washing gun connected to the compressed air supply means,
the water supply means, and the detergent supply means, including
a nozzle, in which a changeover is enabled between a state allowing
the compressed air and the water to be mixed, thereby being jetted
from the nozzle and a state allowing the compressed air and the
detergent to be mixed, thereby being jetted from the nozzle, and
characterized in that the nozzle of the washing gun is formed with
a flat part with flexibility.

[Claim 2] A washing apparatus according to claim 1, wherein the
washing gun further can be changed into a state allowing the compressed
air alone to be jetted from the nozzle.

[Claim 3] A washing apparatus according to claim 1 or 2, wherein
the washing gun further can be changed into a state allowing the
compressed air, the water, and the detergent to be mixed, thereby
being jetted.

[Claim 4] A washing apparatus according to any one of claims 1 to
3, wherein the washing gun is provided with a guide tube outside
the nozzle.

[Claim 5] A washing apparatus according to any one of claims 1 to 4, wherein the compressed air supply means, the water supply means, and the detergent supply means are placed on a movable carriage.

[Claim 6] A washing apparatus according to claim 5, wherein the water supply means has a water tank for storing the water, the detergent supply means has a detergent tank for storing the detergent, and the water tank and the detergent tank are disposed in parallel above the compressed air supply means on the carriage.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention belongs]

The present invention relates to a washing apparatus for carrying out washing by jetting a detergent and water to an object to be washed.

[0002]

[Prior Art]

A washing apparatus is used which carries out washing by jetting a detergent and water to an object to be washed such as an automobile, a motorcycle, a bicycle, or the like. In a conventional washing apparatus as described above, when a detergent and water are sprayed on an object to be washed, the detergent and water sent out with a pump are jetted from a nozzle as they are.

[0003]

[Problem to be solved by the Invention]

Incidentally, there has been a problem in that when a detergent to be used for removing dirt is sent out with a pump to be jetted from a nozzle as described above, the detergent cannot be foamed sufficiently and thus the dirt cannot be removed sufficiently unless a large amount of detergent is used. In addition, with respect to the water to be used for washing away the detergent, there has been a problem that when the water is sent out with a pump to be jetted from the nozzle, the detergent cannot be washed away sufficiently unless a large amount of water is used.

[0004]

Hence, an object of the present invention is to provide a washing apparatus that securely can remove dirt with a minimum amount of detergent and securely can wash away the detergent with a minimum amount of water.

[0005]

[Means for solving the Problem]

In order to attain the above-mentioned object, a washing apparatus according to claim 1 of the present device is characterized by comprising: a compressed air supply means for supplying compressed air; a water supply means for supplying water; a detergent supply means for supplying a detergent; and a washing gun connected to the compressed air supply means, the water supply means, and the detergent supply means, including a nozzle, in which a changeover is enabled between a state allowing the compressed air and the water

to be mixed, thereby being jetted from the nozzle and a state allowing the compressed air and the detergent to be mixed, thereby being jetted from the nozzle, and is characterized in that the nozzle of the washing gun is formed with a flat part with flexibility.

[0006]

As a result of this, in jetting a detergent, when the washing gun is changed into the state allowing compressed air and a detergent to be mixed and then to be jetted from the nozzle, the detergent is mixed with the compressed air to be jetted in a foam form from the nozzle of the washing gun. During this jetting, with the force of the foam flowing through the nozzle, the nozzle makes a reciprocating motion on its jetting leading end side while allowing its flat part to bend in the flattened direction. This reciprocating motion of the nozzle allows the foam jetted from the nozzle to become finer foam in the air to reach an object to be washed. Furthermore, similarly in jetting water, when the washing gun is changed into the state allowing compressed air and water to be mixed and then to be jetted from the nozzle, the water is mixed with the compressed air to be jetted in a mist form from the nozzle of the washing gun. During this jetting, with the force of the water and compressed air flowing through the nozzle, the nozzle makes a reciprocating motion on its jetting leading end side while allowing its flat part to bend in the flattened direction. This reciprocating motion of the nozzle allows the water jetted from the nozzle to be changed

into a finer mist form in the air to reach the object to be washed.

[0007]

A washing apparatus according to claim 2 of the present device is characterized in that, with regard to the washing apparatus according to claim 1, the washing gun further can be changed into a state allowing the compressed air alone to be jetted from the nozzle.

[0008]

As a result of this, when the washing gun is changed into the state allowing compressed air alone to be jetted from the nozzle, the compressed air is jetted from the nozzle of the washing gun. During this jetting, with the force of the compressed air flowing through the nozzle, the nozzle makes a reciprocating motion on its jetting leading end side while allowing its flat part to bend in the flattened direction. This reciprocating motion of the nozzle allows the compressed air to be jetted from the nozzle with a stronger jet force.

[0009]

A washing apparatus according to claim 3 of the present device is characterized in that, with regard to the washing apparatus according to claim 1 or 2, the washing gun further can be changed into a state allowing the compressed air, the water, and the detergent to be mixed and then to be jetted.

[0010]

As a result of this, when the washing gun is changed into the state allowing compressed air, water, and a detergent to be mixed and then to be jetted, the detergent whose concentration is adjusted with the water is mixed with the compressed air to be jetted from the nozzle of the washing gun.

[0011]

A washing apparatus according to claim 4 of the present device is characterized in that, with regard to the washing apparatus according to any one of claims 1 to 3, the washing gun is provided with a guide tube outside the nozzle.

[0012]

As a result of this, when the nozzle makes a reciprocating motion on its jetting leading end side while allowing its flat part to bend in the flattened direction, the range of the reciprocating motion is determined by the guide tube.

[0013]

A washing apparatus according to claim 5 of the present device is characterized in that, with regard to the washing apparatus according to any one of claims 1 to 4, the compressed air supply means, the water supply means, and the detergent supply means are placed on the movable carriage.

[0014]

As described above, the compressed air supply means, the water supply means, and the detergent supply means are placed on a movable

carriage, so the location for washing can be changed easily by moving the carriage.

[0015]

A washing apparatus according to claim 6 of the present device is characterized in that, with regard to the washing apparatus according to claim 5, the water supply means has a water tank for storing the water, the detergent supply means has a detergent tank for storing the detergent, and the water tank and the detergent tank are disposed in parallel above the compressed air supply means on the carriage.

[0016]

As described above, the water tank and the detergent tank are disposed in parallel above the compressed air supply means on the carriage. Hence, the size of the whole can be reduced.

[0017]

[Embodiment Mode of the Invention]

An embodiment of the present invention is described with reference to the drawings as follows. FIGS. 1 and 2 show a washing apparatus 11 according to this embodiment. This washing apparatus 11 includes: an air compressor (a compressed air supply means, a water supply means, and a detergent supply means) 12 for producing compressed air; a substantially cylindrical water tank (a water supply means) 13 for storing water; a substantially cylindrical detergent tank (a detergent supply means) 14 for storing a detergent;

a carriage 15 on which the air compressor 12, the water tank 13, and the detergent tank 14 are placed; and a washing gun 16 connected to the air compressor 12, the water tank 13, and the detergent tank 14.

[0018]

The carriage 15 includes a frame 18, and a lower shelf part 19 and an upper shelf part 20 that are attached to the frame 18. The frame 18 includes: three support parts 22, 23, and 24 that are parallel to each other; a holding part 26 for linking upper end portions of the support parts 22, 23, and 24; laterally extending parts 28 and 29 that are orthogonal to the support parts 22 and 24 disposed on both sides and extend laterally from the lower portions of the support parts 22 and 24; a linking part 31 for linking the extending end portions of the laterally extending parts 28 and 29 to each other; laterally extending parts 33 and 34 that are orthogonal to the support parts 22 and 24 disposed on both sides and extend laterally from the intermediate portions of the support parts 22 and 24; and a linking part 36 for linking the extending end portions of the laterally extending parts 33 and 34 to each other. Portions of the support parts 22, 23, and 24 located on the holding part 26 side with respect to the upper shelf part 20 are tilted partly in an opposite direction to the upper shelf part 20.

[0019]

The lower shelf part 19 is attached to the laterally extending

parts 28 and 29 and the linking part 31 so as to be orthogonal to and extend laterally from the support parts 22, 23, and 24. The upper shelf part 20 is attached to the laterally extending parts 33 and 34 and the linking part 36 so as to be orthogonal to and extend laterally (on the same side as that on which the lower shelf part 19 is attached) from the support parts 22, 23, and 24. Rollers 38 for moving the carriage 15 are supported rotatably in the lower part of the frame 18 on the support parts 22, 23, and 24 side in the state that the rotation axis is disposed in a direction in which the support parts 22, 23, and 24 are arranged.

[0020]

The air compressor 12 is attached onto the lower shelf part 19 in the state that its longitudinal direction is parallel to the direction in which the support parts 22, 23, and 24 are arranged. The water tank 13 and the detergent tank 14 are disposed in parallel on the upper shelf part 20 (i.e. above the air compressor 12) in the state that the respective axial direction are parallel to the direction in which the support part 22 and the like extend and the direction in which they are arranged to each other is parallel to the direction in which the support parts 22, 23, and 24 are arranged.

[0021]

Specifically, the water tank 13 is fixed with a band 40, which is wound around part of the water tank 13 which is located on the opposite side to the support parts 22 and 23 and in which its both

ends are attached to the support parts 22 and 23, in the state that the water tank 13 is placed on the upper shelf part 20 and is fitted between the support part 22 on one side thereof and the support part 23 in the middle.

[0022]

Further, the detergent tank 14 is fixed with a band 41, which is wound around part of the detergent tank 14 which is located on the opposite side to the support parts 23 and 24 and in which its both ends are fixed to the support parts 23 and 24, in the state that the water tank 14 is placed on the upper shelf part 20 and is fitted between the support part 24 on the other side thereof and the support part 23 in the middle.

[0023]

A pipe 43 for supplying compressed air from the air compressor 12 is connected to a connection member 44 attached to an upper part of the water tank 13. A pipe 45 and a pipe 46 are connected to the connection member 44. The pipe 45 is connected to a connection member 47 attached to an upper part of the detergent tank 14, and the pipe 46 to the washing gun 16. Note that the connection member 44 is provided with an opening/closing valve 44a for opening and closing the pipe 43, and the connection member 47 with an opening/closing valve 47a for opening and closing the pipe 45.

[0024]

Here, compressed air sent out from the air compressor 12 is

introduced into the water tank 13 through the pipe 43 and the connection member 44 and provides water stored inside the water tank 13 with a pressure for allowing the water to be sent out. The water sent out by the pressure of the compressed air is introduced to the washing gun 16 through a connection member 49 attached to an upper part of the water tank 13 and a pipe 50. Note that the connection member 49 is provided with an opening/closing valve 49a for opening and closing the pipe 50.

[0025]

In addition, compressed air sent out from the air compressor 12 is introduced into the detergent tank 14 through the pipe 43, the connection member 44, the pipe 45, and the connection member 47 attached to the upper part of the detergent tank 14. The compressed air provides the detergent stored inside the detergent tank 14 with a pressure for allowing the detergent to be sent out. The detergent sent out by the pressure of the compressed air is introduced to the washing gun 16 through a connection member 52 attached to an upper part of the detergent tank 14 and a pipe 53. Note that the connection member 52 is provided with an opening/closing valve 52a for opening and closing the pipe 53. In addition, compressed air sent out from the air compressor 12 is introduced to the washing gun 16 through the pipe 43, the connection member 44, and the pipe 46.

[0026]

As shown in FIGS. 3 and 4, the washing gun 16 includes: a gun body 57 having a holding part 55 to be held by a worker and a lever 56 provided swingably so as to be substantially parallel to the holding part 55; and a connection member 58 attached to the rear end portion of the holding part 55. The washing gun 16 is configured so as to be held by a worker in the state that the lever 56 is arranged on the lower side and the holding part 55 is arranged on the upper side. The pipe 50 and the pipe 53 are connected to the connection member 58. The pipe 46 is connected to the upper part of the gun body 57 located on the opposite side to the lever 56.

[0027]

The three pipes 46, 50, and 53 are arranged so that they can communicate with a mixing chamber, which is not shown in the figures, inside the gun body 57. Here, the connection member 58 is provided with a control valve 58a that opens and closes the pipe 50 and can control its opening amount and a control valve 58b that opens and closes the pipe 53 and can control its opening amount.

[0028]

Further, the washing gun 16 is provided with a nozzle 59 whose inside is allowed to communicate with the mixing chamber, on the opposite side to the connection member 58 of the holding part 55. Note that the lever 56 makes a switch between the states permitting and interrupting the communication between the mixing chamber and the nozzle 59. Specifically, the lever 56 interrupts the

communication between the mixing chamber and the nozzle 59 in the state where the lever 56 is positioned apart from the holding part 55 with an urging force of a spring that is not shown in the figures. On the other hand, the lever 56 permits the communication between the mixing chamber and the nozzle 59 in the state where the lever 56 has been moved swingably to a position close to the holding part 55 against the urging force of the spring that is not shown in the figures.

[0029]

As shown in FIG. 5, the nozzle 59 includes a tubular nozzle body 63 having a through hole 62 passing therethrough in the length direction and a weight part 64 provided on one end side of the nozzle body 63.

[0030]

The nozzle body 63 as a whole is formed integrally to have a substantially constant wall thickness with a flexible material such as, for example, nylon, polytetrafluoroethylene, polyurethane, or polypropylene. In its predetermined intermediate region, a flat part 66 having a so-called flattened form is formed in which its width in one direction orthogonal to the length direction of the nozzle body 63 is set to be narrower than that in the direction orthogonal to the length direction and the one direction. In predetermined regions on both sides of the flat part 66, i.e. at both ends of the nozzle body 63, cylindrical parts 67 and 68 having

a cylindrical shape are formed, respectively. Note that the flat part 66 is in the flattened form even in the state where the nozzle body 63 is in a straight-line form in its length direction. The weight part 64 is formed of a cylindrical member inside of which the cylindrical part 67 located on one side of the nozzle body 63 is fitted. The weight part 64 is made of an elastic material such as silicone or the like.

[0031]

An attaching part 69 is attached to the leading end of the gun body 57. The above-mentioned nozzle 59 is attached to the attaching part 69 with the cylindrical part 68 located on the opposite side to the weight part 64 fitted inside the attaching part 69. Note that the nozzle 59 is attached so that, for example, a flattened direction (a narrower width direction) in the flat part 66 is the left-right direction in the state that the holding part 55 is arranged on the upper side and the lever 56 is arranged on the lower side, and in this attached state, the rotation with respect to the nozzle body 63 is limited.

[0032]

On the nozzle 59 side of the washing gun 16, a tubular body 71 is attached to cover the nozzle 59 by being screwed together with the washing gun 16. This tubular body 71 is composed of a tapered tubular member 72 formed in a tapered form so as to have a smaller diameter on one end side and a larger diameter on the other end

side and a cylindrical guide tube 73 that is fixed inside the tapered tubular member 72 on its smaller-diameter side concentrically therewith. The tubular body 71 is attached to the gun body 57 by the smaller-diameter side of the tapered tubular member 72. In this attached state, the guide tube 73 covers part of the nozzle 59 located on the gun body 57 side from the outside while being disposed substantially concentrically with the nozzle 59. Furthermore, in the attached state, the tapered tubular member 72 covers the nozzle 59 over its entire length from the outside while being disposed substantially concentrically with the nozzle 59.

[0033]

According to the washing apparatus 11 with the configuration described above, when using it, initially all of the opening/closing valves 44a, 47a, 49a, and 52a of the connection members 44, 47, 49, and 52 are opened and therewith the air compressor 12 is brought into a drive state. Subsequently, when the lever 56 of the washing gun 16 is pulled to the holding part 55 side in the state that the control valve 58b and the control valve 58a of the connection member 58 are opened and closed, respectively, the washing gun 16 is brought into the state allowing compressed air and a detergent to be mixed and then to be jetted from the nozzle 59.

[0034]

In other words, in this state, the compressed air from the air compressor 12 is introduced into the mixing chamber of the washing

gun 16 and the detergent from the detergent tank 14 also is introduced into the mixing chamber of the washing gun 16. Thus, the compressed air and the detergent are mixed inside the mixing chamber and then are jetted from the nozzle 59 in a foam form. During this jetting, with the force of the foam flowing through the nozzle 59, the nozzle 59 causes a high speed reciprocating motion (about 40 times/second) on its jetting leading end side while allowing its flat part 66 to bend in the flattened direction. This high speed reciprocating motion of the nozzle 59 imparts a wave motion to the foam passing through the nozzle 59 to cause powerful impulse waves, whereby the foam in the powerful impulse wave form is jetted from the nozzle 59. Hence, the foam jetted from the nozzle 59 becomes finer foam in the air to reach an object to be washed and is delivered into the deep part of the object to be washed with a strong force.

[0035]

Thus, since the detergent can be foamed sufficiently and finely and can be delivered into the deep part of the object to be washed with a strong force, dirt on the object to be washed can be removed securely with a minimum amount of detergent. Specifically, dirt can be removed with a detergent whose amount is about one twentieth the amount required before.

[0036]

On the other hand, when the lever 56 of the washing gun 16 is pulled to the holding part 55 side in the state that the control

valves 58a and 58b of the connection member 58 are opened and closed, respectively, the washing gun 16 is changed into the state allowing compressed air and water to be mixed and then to be jetted from the nozzle 59.

[0037]

In other words, in this state, the compressed air from the air compressor 12 is introduced into the mixing chamber of the washing gun 16 and the water from the water tank 13 also is introduced into the mixing chamber of the washing gun 16. The compressed air and the water are mixed inside the mixing chamber and then are jetted from the nozzle 59 in a mist form. During this jetting, with the force of the water and compressed air flowing through the nozzle 59, the nozzle 59 causes a high speed reciprocating motion (about 40 times/second) on its jetting leading end side while allowing its flat part 66 to bend in the flattened direction. This high speed reciprocating motion of the nozzle 59 imparts a wave motion to the water passing through the nozzle 59 to cause powerful impulse waves, whereby the water in the powerful impulse wave form is jetted from the nozzle 59. Hence, the water jetted from the nozzle 59 becomes finer mists in the air to reach an object to be washed and is delivered into the deep part of the object to be washed with a strong force.

[0038]

Thus, since the water can be atomized sufficiently and finely and can be delivered into the deep part of the object to be washed

with a strong force, the detergent on the object to be washed can securely be washed away with a minimum amount of water. Specifically, the detergent can be removed with water whose amount is about one twentieth the amount required before.

[0039]

In addition, when the lever 56 of the washing gun 16 is pulled to the holding part 55 side in the state that both the control valves 58a and 58b of the connection member 58 closed, the washing gun 16 is changed into the state allowing compressed air alone to be jetted from the nozzle 59. In other words, in this state, only the compressed air from the air compressor 12 is introduced into the mixing chamber of the washing gun 16 to be jetted from the nozzle 59. During this jetting, with the force of the compressed air flowing through the nozzle 59, the nozzle 59 causes a high speed reciprocating motion (about 40 times/second) on its jetting leading end side while allowing its flat part 66 to bend in the flattened direction. This high speed reciprocating motion of the nozzle 59 imparts a wave motion to the compressed air passing through the nozzle 59 to cause powerful impulse waves, whereby the compressed air in the powerful impulse wave form is jetted from the nozzle 59. Hence, the compressed air jetted from the nozzle 59 is delivered into the deep part of the object to be washed with a strong force.

[0040]

Thus, since the compressed air can be jetted from the nozzle

59 with a stronger jet force and can be delivered into the deep part of the object to be washed, water droplets and the like on the object to be washed can securely be blown away and thus the object to be washed can be dried promptly.

[0041]

Additionally, when the lever 56 of the washing gun 16 is pulled to the holding part 55 side in the state that both the control valves 58a and 58b of the connection member 58 are opened, the washing gun 16 is changed into the state allowing compressed air, water, and a detergent to be mixed and then to be jetted from the nozzle 59. In other words, in this state, the compressed air from the air compressor 12 is introduced into the mixing chamber of the washing gun 16 and the water from the water tank 13 also is introduced into the mixing chamber of the washing gun 16. In addition, the detergent from the detergent tank 14 is introduced into the mixing chamber of the washing gun 16. The compressed air, the water, and the detergent are mixed together inside the mixing chamber and then are jetted from the nozzle 59 in a foam form. During this jetting, with the force of the foam flowing through the nozzle 59, the nozzle 59 causes a reciprocating motion on its jetting leading end side while allowing its flat part 66 to bend in the flattened direction. This reciprocating motion of the nozzle 59 allows the foam jetted from the nozzle 59 to become finer foam in the air to reach an object to be washed.

[0042]

Thus, the detergent whose concentration is adjusted with the water is mixed with the compressed air to be jetted from the nozzle 59 of the washing gun 16. Thus, the detergent can be jetted with its concentration adjusted by being mixed with the water.

[0043]

As described above, in the washing gun 16, the guide tube 73 is provided outside the nozzle 59 substantially concentrically with the nozzle 59. Hence, when the nozzle 59 causes a reciprocating motion on its jetting leading end side while allowing its flat part 66 to bend in the flattened direction, the range of the reciprocating motion is determined by the guide tube 73. Thus, the range of jetting by the nozzle 59 can be set.

[0044]

In addition, the air compressor 12, the water tank 13, and the detergent tank 14 are placed on and fixed to the movable carriage 15. Hence, by moving the carriage 15, the location for washing can be changed easily. Furthermore, the water tank 13 and the detergent tank 14 are disposed in parallel above the air compressor 12 on the carriage 15. Hence, the size of the whole can be reduced.

[0045]

Note that, in the above-mentioned embodiment, the description was directed to the case where the connection member 58 connected to the pipes 50 and 53 is attached to the rear end portion of the

holding part 55 and the pipe 46 is attached to the gun body 57 on its opposite side to the lever 56, as an example. However, the pipe 46 may be attached to the rear end portion of the holding part 55 and the connection member 58 connected to the pipes 50 and 53 may be attached to the gun body 57 on its opposite side to the lever 56.

[0046]

[Effect of the Invention]

As described above in detail, according to the washing apparatus described in claim 1 of the present invention, in jetting a detergent, when the washing gun is changed into the state allowing compressed air and a detergent to be mixed and then to be jetted from the nozzle, the detergent is mixed with the compressed air to be jetted in a foam form from the nozzle of the washing gun. During this jetting, with the force of the foam flowing through the nozzle, the nozzle causes a reciprocating motion on its jetting leading end side while allowing its flat part to bend in the flattened direction. This reciprocating motion of the nozzle allows the foam jetted from the nozzle to become finer foam in the air, to thereby reach an object to be washed. Hence, since the detergent can be foamed sufficiently and finely, dirt on the object to be washed can be removed securely with a minimum amount of detergent.

[0047]

Furthermore, similarly in jetting water, when the washing gun

is changed into the state allowing compressed air and water to be mixed and then to be jetted from the nozzle, the water is mixed with the compressed air to be jetted in a mist form from the nozzle of the washing gun. During this jetting, with the force of the water and compressed air flowing through the nozzle, the nozzle causes a reciprocating motion on its jetting leading end side while allowing its flat part to bend in the flattened direction. This reciprocating motion of the nozzle allows the water jetted from the nozzle to be changed into a finer mist form in the air, to thereby reach the object to be washed. Hence, since the water can be atomized sufficiently and finely, the detergent on the object to be washed can securely be washed away with a minimum amount of water.

[0048]

According to the washing apparatus described in claim 2 of the present invention, when the washing gun is changed into the state allowing compressed air alone to be jetted from the nozzle, the compressed air is jetted from the nozzle of the washing gun. During this jetting, with the force of the compressed air flowing through the nozzle, the nozzle causes a reciprocating motion on its jetting leading end side while allowing its flat part to bend in the flattened direction. This reciprocating motion of the nozzle allows the compressed air to be jetted from the nozzle with a stronger jet force. Hence, since the compressed air is jetted from the nozzle with a stronger jet force, water droplets and the like on the object

to be washed can securely be blown away and thus the object to be washed can be dried promptly.

[0049]

According to the washing apparatus described in claim 3 of the present invention, when the washing gun is changed into the state allowing compressed air, water, and a detergent to be mixed and then to be jetted, the detergent whose concentration is adjusted with the water is mixed with the compressed air to be jetted from the nozzle of the washing gun. Hence, the detergent can be jetted with its concentration adjusted by being mixed with the water.

[0050]

According to the washing apparatus described in claim 4 of the present invention, when the nozzle causes a reciprocating motion on its jetting leading end side while allowing its flat part to bend in the flattened direction, the range of the reciprocating motion is determined by the guide tube. Hence, the range of jetting by the nozzle can be set.

[0051]

According to the washing apparatus described in claim 5 of the present invention, the compressed air supply means, the water supply means, and the detergent supply means are placed on the movable carriage. Hence, by moving the carriage, the location for washing can be changed easily.

[0052]

According to the washing apparatus described in claim 6 of the present invention, the water tank and the detergent tank are disposed in parallel above the compressed air supply means on the carriage. Hence, the size of the whole can be reduced.

[Brief Description of the Drawings]

[FIG. 1] A front view showing an embodiment of a washing apparatus according to the present invention.

[FIG. 2] A side view showing the embodiment of a washing apparatus according to the present invention.

[FIG. 3] A side view showing a washing gun used for the embodiment of a washing apparatus according to the present invention with a part thereof shown by a sectional view.

[FIG. 4] A plan view showing the washing gun used for the embodiment of a washing apparatus according to the present invention with a part thereof shown by a sectional view.

[FIG. 5] Diagrams showing a nozzle of the washing gun used for the embodiment of a washing apparatus according to the present invention: FIG. 5(a) is a sectional side view; FIG. 5(b) a sectional plan view; and FIG. 5(c) a sectional front view.

[Description of Reference Numerals]

- 11 washing apparatus
- 12 air compressor
- 13 water tank
- 14 detergent tank

- 15 carriage
- 16 washing gun
- 59 nozzle
- 66 flat part
- 73 guide tube

圧縮空気と混合され泡状となって噴出する。そして、この噴出時に、ノズルを流れる泡の力で、ノズルが、その偏平部を偏平方向において湾曲させつつ噴出先端側に往復運動を生じることになる。このノズルの往復運動で、ノズルから噴出される泡がさらに空気中で細かい泡となって、被洗浄物に到達する。したがって、洗剤を十分にかつ細かく泡立たせることができるため、最小限の洗剤で被洗浄物の汚れを確実に落とすことができる。

【0047】また、水を噴出させる際にも、洗浄ガンを圧縮空気と水とを混合させてノズルから噴出させる状態に切り換えると、洗浄ガンのノズルから水が圧縮空気と混合され霧状となって噴出する。そして、この噴出時に、ノズルを流れる水および圧縮空気の力で、ノズルが、その偏平部を偏平方向において湾曲させつつ噴出先端側に往復運動を生じることになる。このノズルの往復運動で、ノズルから噴出される水がさらに空気中で細かい霧状となって、被洗浄物に到達する。したがって、水を十分にかつ細かく霧状にすることができるため、最小限の水で被洗浄物の洗剤を確実に洗い流すことができる。

【0048】本発明の請求項2記載の洗浄装置によれば、洗浄ガンを圧縮空気のみをノズルから噴出させる状態に切り換えると、洗浄ガンのノズルから圧縮空気が噴出する。そして、この噴出時に、ノズルを流れる圧縮空気の力で、ノズルが、その偏平部を偏平方向において湾曲させつつ噴出先端側に往復運動を生じることになる。このノズルの往復運動で、圧縮空気がより大きな噴出力でノズルから噴出されることになる。したがって、圧縮空気がより大きな噴出力でノズルから噴出されることになるため、被洗浄物の水滴等を確実に吹き飛ばすことができ、被洗浄物を即座に乾燥させることができる。

【0049】本発明の請求項3記載の洗浄装置によれば、洗浄ガンを圧縮空気と水と洗剤とを混合させて噴出させる状態に切り換えると、水で濃度が調整された洗剤が圧縮空気と混合されて洗浄ガンのノズルから噴出する。したがって、洗剤を水と混合させてその濃度を調整*

した状態で噴出させることができる。

【0050】本発明の請求項4記載の洗浄装置によれば、ノズルがその偏平部を偏平方向において湾曲させつつ噴出先端側に往復運動を生じる際に、ガイド筒によって往復運動の範囲が決められることになる。したがって、ノズルによる噴出の範囲を設定することができる。

【0051】本発明の請求項5記載の洗浄装置によれば、圧縮空気供給手段、水供給手段および洗剤供給手段が、移動可能な台車に載置されているため、台車を移動させることで、洗浄場所を容易に変えることができる。

【0052】本発明の請求項6記載の洗浄装置によれば、水タンクおよび洗剤タンクを、台車上の圧縮空気供給手段の上側に並列配置させているため、全体を小型化することができる。

【図面の簡単な説明】

【図1】 本発明の洗浄装置の一の実施の形態の正面図である。

【図2】 本発明の洗浄装置の一の実施の形態の側面図である。

【図3】 本発明の洗浄装置の一の実施の形態に用いられる洗浄ガンを示す一部を断面とした側面図である。

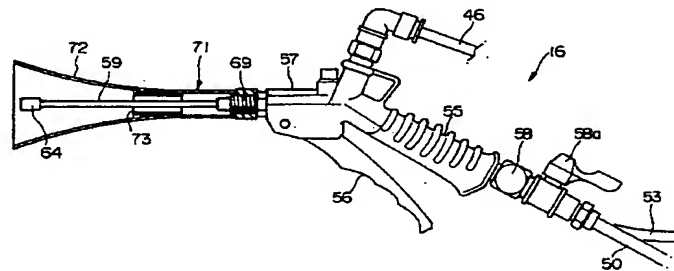
【図4】 本発明の洗浄装置の一の実施の形態に用いられる洗浄ガンを示す一部を断面とした平面図である。

【図5】 本発明の洗浄装置の一の実施の形態に用いられる洗浄ガンのノズルを示すもので、(a)は側断面図、(b)は平断面図、(c)は正断面図である。

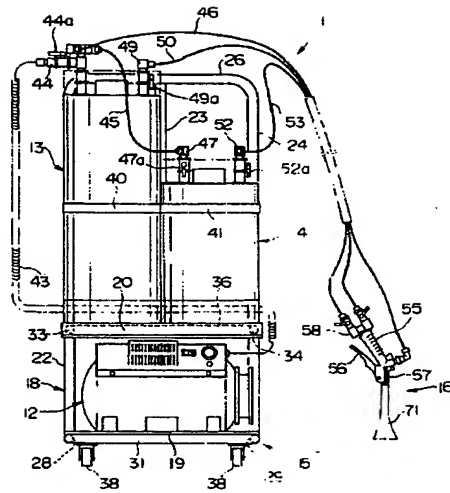
【符号の説明】

- 11 洗浄装置
- 12 エアコンプレッサ
- 13 水タンク
- 14 洗剤タンク
- 15 台車
- 16 洗浄ガン
- 59 ノズル
- 66 偏平部
- 73 ガイド筒

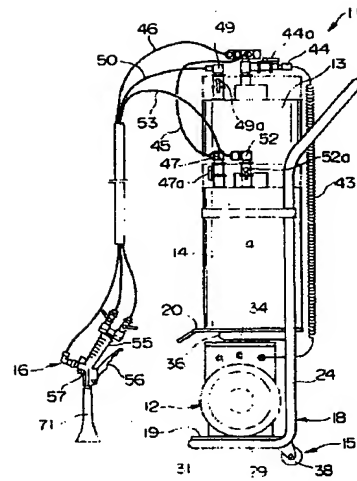
【図3】



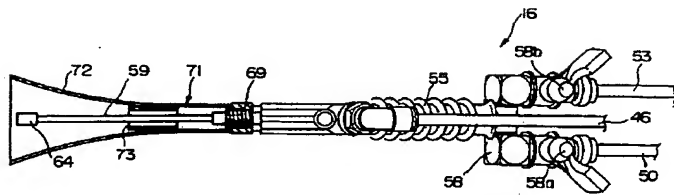
【図1】



【図2】



【図4】



【図5】

